
10 Pipe Placement

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CHAPTER TEN: PIPE PLACEMENT

EXCAVATION

Unless otherwise directed, the trench cross sectional dimensions are required to be as shown on the plans. The trench bottom should give full support to the pipe. Recesses are cut to receive any projecting hubs or bells on concrete pipe.

Figure 10-1 shows some basic trench requirements. These are also shown on Standard Drawings **E 715-BKFL – 01** through **E 715 BKFL – 09**.

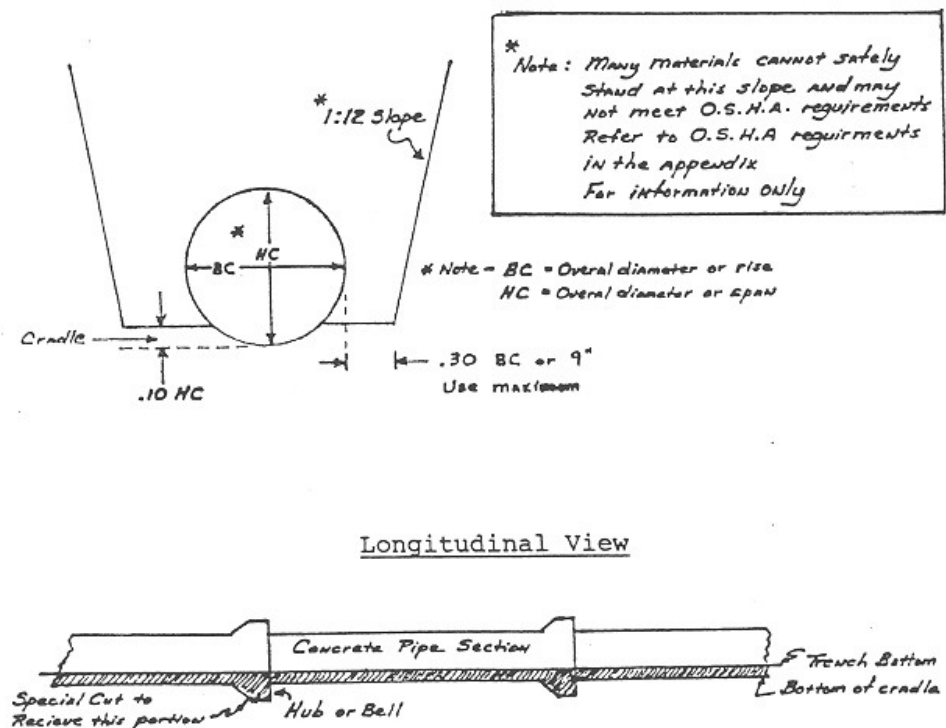


Figure 10-1. Pipe Excavation

Pipes in fill areas should be excavated only after the fill elevation is to a height equal to the top of the pipe plus the minimum cover on the pipe. The recommended cover, where heavy construction equipment will be crossing the pipe structure, is as follows:

- 1) Up to and including 18 in. diameter or equal – 1 ft 6 in. cover
- 2) 21 in. diameter or equal up to and including 54 in. diameter or equal – 3 ft cover
- 3) Over 54 in. diameter or equal – 4 ft cover

When the fill height is sufficient to provide the cover listed, the structure may be placed.

ROCK EXCAVATION

When rock is encountered during trench excavation at the flowline elevation, the trench bottom is required to be excavated at least 8 inches below the required elevation, backfilled with B borrow to the proper grade, and compacted to Specification requirements.

UNSUITABLE MATERIAL

Any time soft or unstable material is found at the required flowline elevation, such material is required to be removed and replaced. B borrow may be used as the replacement material.

EXCESS EXCAVATION PAYMENT

Cut volumes and B borrow for replacing soft areas are required to be recorded. If the quantity of excavation exceeds 10 cubic yards, the quantity is required to be paid as three times the excavation class required.

REMOVAL OF EXISTING STRUCTURES

Normally, removal of an existing structure is included in the cost of a new structure item unless a special item is included for the removal. This procedure consists of removing the existing pipe, head walls, box culvert, and footings to outside the limits of excavation for the new structure.

SAFETY

A special concern for safety is required for deep pipe trenches. The Contractor should have the necessary safety equipment available such as

safety boxes in deep pipe or sewer cuts and/or sheeting or shoring as directed by safety requirements. (See Appendix for OSHA requirements)

LAYING PIPE

STRUCTURE BEARING

Each section of pipe is required to have full bearing for the entire length of pipe and be placed true to the line and grade. Any pipe that does not meet these requirements is required to be re-laid at no additional cost. No pipe is allowed to be placed on a frozen trench bottom.

LAYING CONCRETE OR CLAY BELL PIPE

When laying concrete or clay pipe, the hub or bell end is required to be placed up-grade with the spigot end fully inserted into the next hub and with all ends fitted together tightly.

Pipe joints designed to accommodate seals or pipe joints requiring seals are sealed with approved rubber type gaskets, caulking, bituminous mastic pipe joint sealer, electrometric material, or sealing compound.

If infiltration of water is a factor, each joint, regardless of the type used, is required to be sealed with an approved compression type joint sealer in accordance with the Specifications.

ABS PIPE

If ABS pipe (plastic) is used, all joints are required to be of the solvent cement type and installed according to the manufacturers recommendations.

METAL PIPE

Prior to placing corrugated metal pipe, the sections are required to be checked for the proper fit. If sections do not fit together properly, they may be rejected since they could easily leak. This may be a problem on spiral pipe because some Suppliers cut sections to lengths and the end cuts are not square cut. Pipe sections are joined with approved coupling bands.

When placing riveted corrugated metal pipe, the section laps are required to be placed downstream.

MULTI-PLATE PIPE

When placing and assembling Structural Plate Steel or Multi-Plate Structures, the Contractor is required to follow the lap of the plate sections

as shown on the shop drawings. The shop drawings are furnished by the Supplier for the proper fit and loading of the pipe structure. Special nuts and bolts may be used for assembly. These nuts and bolts may have crowned faces so they fit down into the corrugations. The proper bolts should always be used.

The Appendix should be checked for a detailed manual on Installation Instructions for Multi-Plate assembly for Pipe Arch.

JOINING PIPE

JOINING PIPE WITH COLLARS

When a satisfactory joint cannot be made, different types of pipe are connected, or an existing structure is extended, a concrete collar is required to be placed.

At the connection of two different types of pipe, the collars are required to be at least 18 inches wide and 6 inches thick.

When joining pipes of different strengths, the pipe of lesser strength than the main pipe is required to be incased in concrete at least 6 inches thick.

STUB-TEE CONNECTIONS

At locations indicated on the plans or where directed, a stub-tee connection of the size required is furnished and connected to the pipe type specified.

METAL PIPE

The stub-tee for corrugated metal pipe structures is required to be long enough to band to connecting pipes. The band may be a band-type tee or saddle type tee. The stub-tee is bolted or banded to the larger pipe.

CONCRETE PIPE

On concrete pipe, the tee connection may be factory made or field fitted. The stub for the tee is required to be at least 6 inches long and no more than 12 inches in length and shall be secured in place by a mortar bead or a concrete collar.

PIPE END TREATMENTS

The pipe end treatments that may be used include:

- 1) Pipe anchors
- 2) Pipe end sections
- 3) Safety metal end sections
- 4) Grated box end sections

PIPE ANCHORS

Standard Drawings **E 715-MPCA – 01 & 02**, **E 715-PAHB – 01**, and **E 715-PASD - 01** show different sizes and measurements for pipe anchors. Pipe anchors are mainly used on larger pipe sizes. They are placed to prevent the water flow from undermining the ends of the pipe which could cause settlement or wash outs.

Pipe anchors are poured in place using class A concrete and are held to the pipe by either anchor bolts or straps.

PIPE END SECTIONS

Standard Drawings **E 715-MPES – 01, 02, & 03** and **E 715-PCES -01** show different pipe end sections that are available in either metal or precast concrete. Metal pipe end sections connect to the pipe by a strap band or a ring type bolt that draws the end section tight to the pipe. These units have a toewall that is placed in a cut trench and backfilled. This toewall serves the same purpose as an anchor; to keep water from undermining the pipe.

Precast concrete end sections are designed for use on concrete pipe. The inside of the end section is grooved to accept the spigot end of a concrete pipe. After the precast pipe end section is set in place, an anchor is poured using class A concrete. The anchor has hook bolts extending through the end section floor and is secured by nuts and washers.

GRATED BOX END SECTIONS AND SAFETY METAL END SECTIONS

Grated box end sections and safety metal end sections are used to provide a safety slope over the structure opening. Safety metal end sections are detailed on Standard Drawings **E 715-SMES – 01 through E 715 SMES – 12**, and grated box end sections on Standard Drawings **E 715-GBTO – 01 through E 715-GBTO – 08** and **E 715-GBTT – 01 through E 715-GBTT - 06**. There are two basic types of grated box end sections: Type I and Type II.

GBES Type I

Type I grated end sections (Figure 10-2) are used on crosspipes under the roadway or other structures perpendicular to the direction of traffic. These units are constructed to the same slope as the embankment they fit into and have a tubular type grating which supports vehicles traveling across them.

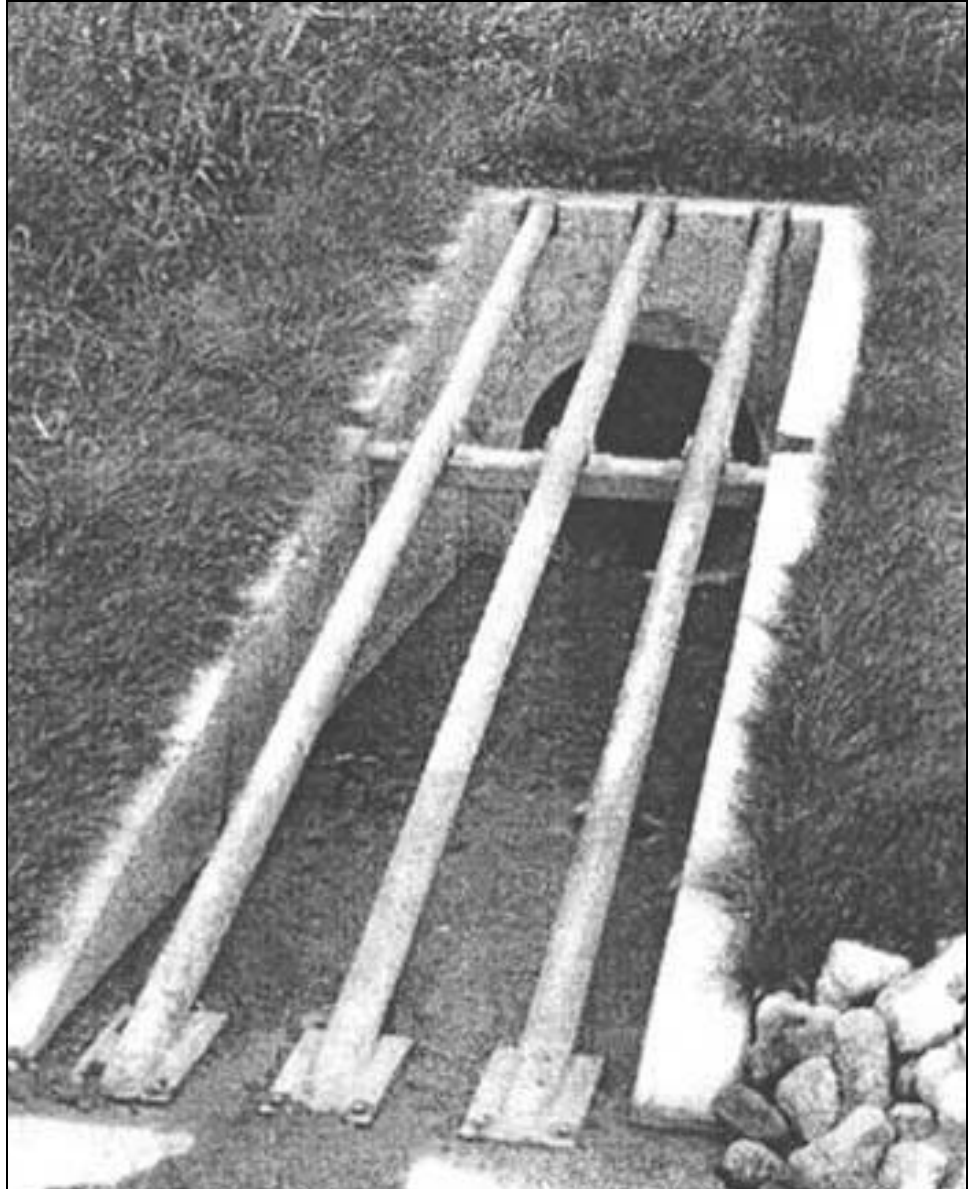


Figure 10-2. GBES Type I

GBES Type II

Type II grated box end sections (Figure 10-3) are used where the end of a structure would be facing incoming traffic. They are built to flatter slopes and have a crossbar grating for vehicle support.

Both Type I and Type II units may be either precast or constructed in place. In either case, the units are set on a bed of No. 8 aggregate and the structure is partially backfilled with No. 8 aggregate. This procedure allows ground water to filter in through weep pipes in the sides of the units. Precast units have a toewall that is poured with class A concrete after the unit is set. Constructed in place units are poured with class A concrete and reinforcing steel as designated in the Standard Sheets.



Figure 10-3. GBES Type II